

FY05-LIII(53)-140

“Activated Carbon Production from North Dakota Lignite”

Submitted by: Energy & Environmental Research Center

Project Duration: 9 months

Principal Investigator: Steve Benson

PARTICIPANTS

<u>Sponsor</u>	<u>Cost Share</u>
BNI Coal	\$ 125,000
Minnesota Power Co.	\$ 125,000
DOE	\$ 50,000
NDIC	<u>\$ 250,000</u>
Total Cost	\$ 770,000

Project Schedule - 9 Months

Contract Date – June 10, 2005

Start Date – June 14, 2005

Completion Date – ~~May 1, 2006~~

Extended to – ~~September 30, 2006~~

– January 31, 2007

Project Deliverables

Contract Signed: ✓

Quarterly Reports:

10/1/05(✓);

1/1/06(✓); 4/1/06(✓)

Final Report 1/31/07()

OBJECTIVE / STATEMENT OF WORK:

Determine the feasibility to develop a commercial process for activated char (AC) production from lignite by scaling results from EERC bench-scale screening tests to vendor pilot-scale reactors that would provide data for a commercial scale technology. The effectiveness of the AC mercury capture produced by the vendor reactor would be evaluated in pilot plant and slipstream tests. Conduct a market assessment and conceptualize a commercial an AC production plant that would be collocated with an existing power plant

Supporting Projects:

FY-05-LI(51)-131 “Investigation of Mercury and Carbon-Based Sorbent Reaction Mechanisms”

Program Funding: \$54,000; Total Project Funding: \$240,870. Improve mercury capture efficiency of carbon sorbents through a better understanding of mercury-sorbent reaction mechanisms. Project will produce information to develop more effective and lower-cost sorbent to control elemental mercury emissions.

CATM \$50,000	DOE \$46,870	EPRI \$18,000
Coteau Properties \$18,000	Westmoreland \$15,000	Westmoreland (in-kind) \$ 3,000
Falkirk (in-kind) \$18,000	BNI (in-kind) \$18,000	NDIC \$54,000

FY05-LIII-139 “Investigation of Mercury and Carbon-Based Sorbent Reaction Mechanism – Comparison of Surface Analysis Techniques”

Program Funding: \$19,500; Total Project Funding: \$60,000. This project is an extension of LRC-LI (51)-131. Additional fundamental work will focus on bonding on carbon surfaces using two more refined techniques of x-ray photoelectron spectroscopy and x-ray absorption fine structure spectroscopy. The results will define carbon sorbent surface structural features before and after exposure to a flue gas stream, providing direction to improving effectiveness.

SaskPower	\$ 19,500	DOE	\$ 21,000	NDIC	\$ 19,500
-----------	-----------	-----	-----------	------	-----------

Status FY05-LIII-140

July 1 – September 30, 2005 Status Report

A bench-scale rotary kiln was made fully operational followed by shakedown carbonization tests using Center mine lignite. Shakedown tests preliminary results indicate production of good intermediate char, although best conditions will be defined in future tests.

October 1 – December 21, 2005

Two types of Hagel lignite coal were sized to nominal -1/8 inch + 10-mesh material. Carbonation was carried out on a semi-continuous basis. Steam activation of carbonized lignite was investigated. Mercury capture results in a pilot scale ESP with subbituminous coal flue gas using Center Mine lignite and DARCO carbon were compared.

January 1 – March 31, 2006

Additional testing was conducted to evaluate the properties of the activated carbon samples generated from North Dakota lignite. The mercury capturing performance was evaluated and compared to the DARCO carbon. The carbon was evaluated for iodine number. A feasibility study including process design, equipment selection, and component layout have been for an activated carbon production plant near a North Dakota power plant.

April 1 – June 30, 2006

Development of a test matrix for preparing a new batch of coal in the rotary kiln for pilot-scale testing on a combustor equipped with an electrostatic precipitator, evaluation of sorbent performance, and a market assessment.